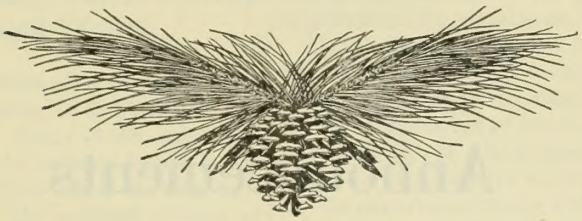
FOREST WORKER



January, 1933

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UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

Announcements

Meetings of New England and New York Foresters Scheduled

The New England section of the Society of American Foresters will hold its annual meeting in Manchester, N. H., February 6–7, 1933. The sessions will be held at the Hotel Carpenter.

The New York Section of the society will meet February 4, 1933, at Syracuse, N. Y.

February 3 has been set as the date of the annual meeting of the New York State Forestry Association at Rochester.

New Date Set for Marshall Memorial Dedication

Dedication of the Louis Marshall memorial science building at the New York State College of Forestry, Syracuse University, originally planned for November 18, 1932, and postponed, has been definitely set for February 23, 1933. The program for the meeting is being developed by Samuel N. Spring, assistant dean of the college. The building will house the departments of silviculture, forest zoology, entomology, and botany, and the Roosevelt Wild Life Experiment Station.

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FOREST WORKER

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State Forestry

California Starts Second Winter's Work in Unemployment Camps

At least 7,000 jobless men from all over the country will be cared for during the winter of 1932–33 in California unemployment camps. Many of the camps will be located within or adjacent to national forests in the southern part of the State where winter working conditions are better and where the greatest number of unemployed transients congregate. About 4,500 men will be cared for in camps supervised by members of the State division of forestry; camps accommodating about 2,500 will be under the supervision of officers of the United States Forest Service, with 100 to 300 men in each camp. Opening of the camps was delayed by the prolonged fire season in southern California which required the continuance of the protection personnel on their regular duties.

Although $300,000 of the $400,000 provided by the State for unemployment camps this year comes from gas-tax money and is available only for projects that will benefit the highway system, it is thought that this provision will not interfere greatly with the development of a program highly beneficial to forest protection. The tremendous damage to highways following fire, particularly in the brush fields of southern California, justifies substantial expenditures from highway funds for protection of the areas through which the roads pass. Projects upon which gas-tax money will be spent are submitted to the State highway division for approval. The remaining $100,000 is from the governor's emergency fund and constitutes a special increase of the firebreak appropriation in the State forester's budget.

Forest Work Important in Wisconsin Relief Program

Most of the labor employed by the Wisconsin Conservation Department under the State unemployment relief program, for which $500,000 was appropriated, has been used in the construction of fire roads and lanes through forest-protection districts, the erection of lookout towers, and other forest work. During the first seven months of the program, 9,300 men were employed in 24 counties on 369 projects.

Cone collection enabled 225 other persons to earn $3,484.25, an average of about $15.50 each. The need of the conservation department for seed was increased by the enlargement of the Trout Lake nursery and the establishment of a new nursery. The cones were collected in the northern counties, 2,371 bushels bought by the department being white pine and 1,515 bushels Norway pine. Prices paid were 50 and 75 cents a bushel for white pine and $1.50 for Norway pine cones. Enough seed was obtained to fill the State's needs for several years.

New York Planting Program Analyzed at State Foresters' Meeting

W. G. Howard, superintendent of lands and forests of New York State, presented an analysis of his State's $20,000,000 reforestation program at a session of the annual meeting of the Association of State Foresters held in New Jersey, October 17–19, 1932. This program, explained Mr. Howard, is primarily for the reclamation of waste land rather than the acquisition of forested areas. It is concentrated in the central and south central parts of the State. Objects to be attained through the program were listed by him in the following order of importance: Watershed protection; development of public recreation and hunting grounds; production of timber; improvement in appearance of the countryside. The maximum price to be paid for land was first set at $3.50 per acre, but this was raised to $4. By October, 1932, 179,000 acres had been purchased at an average price of $3.87 per acre and 50,000,000 trees had been planted on 61,300 acres.

Some of the principal problems involved in such an extensive reforestation operation as New York has undertaken are, according to Mr. Howard: Obtaining sufficient supplies of tree seed; protection of areas from fire, tree diseases, and insects; production of a sufficient quantity of planting stock in nurseries. Species used for planting have been in the proportions of 32 per cent Norway spruce, 31 per cent Norway pine, 20 per

cent white pine, and the remaining 17 per cent miscellaneous species including white spruce, white cedar, balsam, European larch, Japanese larch, black locust, white ash, and white and red oaks.

The meeting of the association took the form of a 3-day tour in busses through the principal forest regions of New Jersey with business sessions at Trenton, Atlantic City, and Newark. Forty-four foresters attended, representing 22 States, the American Forestry Association, and the United States Forest Service.

The Larch Case Bearer Menaces Maine Forests

By Robley W. Nash, Maine Forest Service

Since 1922, stands of larch throughout Maine have been severely injured by repeated attacks of the larch case bearer (*Coleophora laricella*). Complete defoliation is caused by this European insect and many trees have been killed. Infested trees have the appearance of having been scorched by fire.

The small, ash-gray moths, with a wing expanse of about three-eighths of an inch, appear about the first of July and lay their small, orange-colored eggs singly on the larch needles. The young larvæ tunnel directly into the needles and continue to mine until September when they cut off portions of the hollowed leaves and form cigar-shaped cases. They then migrate with their cases to the twigs, branches, and trunks of the trees, where they remain over winter. In the spring the larvæ push their bodies from the cases and crawl to the new needles, tunneling into them and hollowing them out. It is at this time of the year that the heaviest feeding is done. Though larch is the preferred host plant, larvæ have been found feeding on white pine and balsam fir trees which have been growing beside infested larches.

The larvæ prefer locations protected from winds. It has been observed that in attacking a tree the insects feed first on the foliage of the lower limbs.

Larch constitutes a considerable part of the Maine forests. The heartwood is very durable in contact with the soil. Larch wood is used for posts, ties, telephone poles, paving blocks, ship knees, tanks, silos, and refrigerators. It is one of the strongest and heaviest of our native softwoods, only longleaf pine being notably superior. Normally it grows to a large size, but repeated attacks of the case bearer and the larch saw-fly have retarded its growth in Maine to a large extent.

Defoliation by the larch case bearer has killed from 25 to 33 per cent of the larch trees in some sections of the State. It is feared that many of the trees still surviving will succumb with continued defoliations as heavy as those of the last few years. The growth at present is but 40 per cent of the normal rate. On sample plots, trees of other species have maintained a steady rate of growth or have increased the rate during the same period, which would indicate that the case bearer alone is the cause of the retarded development of the larches.

To prevent widespread injury by this insect, it is advisable under forest conditions to maintain mixed plantations. In some cases the pruning of the lower limbs when the attack is first starting will succeed in checking it. European foresters recommend the planting of larch in naturally well-drained places with careful management to insure free circulation of air about the trees. Such management is also advised by European workers for prevention of the larch canker found a few years ago in Massachusetts.

Possibility of control by native parasites, in Maine at least, is very doubtful. Efforts to discover parasitic material have not yielded satisfactory results.

During the past year the Maine Forest Service has tried different solutions of insecticides for the control of the case bearer. G. W. Herrick in a paper entitled "The Larch Case-Bearer" [1] recommended the use of a lime-sulphur spray. This spray should be applied in the late spring dormant season and, as recommended by Professor Herrick, should be diluted at the rate of 1 gallon to 8¼ gallons of water when the concentrated solution tests 33° Baumé. Applications were made to test the different insecticides and especially to find means of control which could be used in the summer.

The first applications were made on May 18, 1931, with the following percentages of insects killed by the different solutions used:

Lead arsenate, 2 pounds to 100 gallons of water, 17 per cent dead;

Nicotine sulphate (1–400) plus liquid potash soap (1–600), 54 per cent dead;

Pyrethrum solution (1–400) plus liquid potash soap (1–600), 83 per cent dead;

Nicotine sulphate (1–400) plus Pyrethrum solution (1–400) plus liquid potash soap (1–600), 90 per cent dead.

The lead-arsenate spray caused considerable burning.

Trees were sprayed on July 13, 1931, to see if eggs could not be killed along with newly hatched larvæ. Hatched larvæ at this time were inside the needles and not in cases as they were when the sprays were applied on May 18. Lead arsenate was tried again and again caused severe burning. It was used in a 2–100 dilution plus raw linseed oil (1–800) and killed 4 per cent of the eggs and 10 per cent of the larvæ treated. (Counts were taken after the eggs had hatched.) Pyrethrum solution (1–400) plus liquid potash soap (1–600) killed 20 per cent of the eggs and 10 per cent of the larvæ. Nicotine sulphate (1–400) plus liquid potash soap (1–600) killed 28 per cent of the eggs and 68 per cent of the larvæ.

On November 5, 1931, dormant sprays of miscible oil were applied. Dilutions of 1 part oil to 30 parts of

[1] Cornell University Agricultural Experiment Station Bulletin 322, 1912.

water gave less than 40 per cent control and hence were not satisfactory. Dilutions of 1 to 15 gave very satisfactory control. In two applictions control percentages of 99.5 and 98.5 were obtained. Similar dormant applications of the same oil made in the spring of 1932 gave variable and unsatisfactory results.

Three Districts Added to Indiana Protection System

Indiana now has eight forest-fire districts, giving systematic fire protection to 1,115,000 acres of State and privately owned forest land. Three of these are new districts established in the fall of 1932, each furnished with a new lookout tower.

An 80-foot steel tower overlooks the first new unit of 100,000 acres of forest land in the "knob" region in Floyd, Harrison, and Clark Counties, one of the worst fire districts in the State. The second district's tower, 100 feet in height, is about 5 miles south of Paoli and overlooks about 75,000 acres in southern Orange and northern Crawford Counties. The tower is on 55 acres of land set apart for experimental and demonstration forest plantings. The third district has an 80-foot tower situated in the Jackson County State Forest with a range of 75,000 acres in Clark, Brown, Washington, and Lawrence Counties.

California Still Free from Blister Rust

A scouting tour of about two months, conducted by the Division of Blister Rust Control of the Bureau of Plant Industry in the northern part of California and in the Sierra region as far south as the Stanislaus National Forest, revealed no signs of white pine blister rust. Inspections were made on pine and Ribes at strategic locations with reference to close association of the two hosts and sites favorable for the rust to strike and spread.

It was feared that the disease would be found in the northwestern corner of California bordering on Curry County, Oreg., where it has been active for several years, but its presence there still represents the southernmost point of its spread in the West. In the Cascade Range it was found on the currant host 25 miles farther south this year than last, or about 160 miles north of the California line.

A tract of about 23 acres has been presented to the State of New Hampshire by W. B. Douglass, of Boston, Mass., and Wilmot, N. H. The land is on the westerly slope of Mount Kearsarge at the end of the public road, nearly 1,900 feet above sea level, and furnishes an important approach to 1,360 acres of public forest land on the upper slopes of the mountain.

Wisconsin Starts Work on New Nursery

A forest-tree nursery is being developed by the Wisconsin Conservation Department on 20 acres of land given to the State for the purpose by the Nekoosa-Edwards Paper Co. The tract is in Wood County, about 4 miles south of Wisconsin Rapids. Eight hundred seed beds, 4 by 8 feet and averaging 5,000 seedlings to a bed, were ready in the fall of 1932 for planting with white, Norway, and jack pines and Norway and white spruce. Additional beds to be established in the spring will bring the capacity of the nursery to 5,000,000 trees.

Seedlings from the 1932 fall sowing will be available for planting in the fall of 1934. After that it is expected that one half of the 10,000,000 seedlings called for annually by Wisconsin's program of planting on State forest lands will be produced in this nursery; the other half of the stock needed will be supplied by the Trout Lake State nursery, in the Northern State Forest in Vilas County.

Mississippi Protective Area Makes Good Fire Suppression Record

Although a greater number of fires occurred during the fiscal year 1932 in the Pascagoula Protection Area of Mississippi than were ever before recorded, the acreage burned, average size of fire, and estimated damage were the lowest on record, reports K. E. Kimball, District Forester. Fire crews answered 1,078 alarms and fought 731 fires which burned 13.1 per cent of the 400,000-acre area. The average fire burned 71.7 acres. The majority of fires occurred between February 15 and April 9, 1932, of which 93 per cent were of incendiary origin. The average total elapsed time between discovery and control of a fire was 2 hours 19 minutes 18 seconds, of which 1 hour 41 minutes 28 seconds was control time; only 37 minutes 50 seconds elapsed between the start of the fire and arrival of the crew.

South Carolina added three new fire-protection associations, averaging 33,000 acres each, to its protective system during the past year. One of the areas is in the coastal-plain region of the State, one in the sand hills, and the third in the mountainous section. Four fire towers are in use by the new associations.

An entire floor of the new administration building of the Texas A. and M. College, which is now under construction at College Station, Tex., and is expected to be completed in October, 1933, has been assigned to the Texas Forest Service.

Blister Rust Control Record in Pennsylvania

During 1932 the Pennsylvania Department of Forests and Waters in cooperation with the Bureau of Plant Industry protected 121 areas from blister rust through the cooperation of private owners and carried on 100 projects without assistance from the owners. In addition, work was done on 31 areas in State forests by the personnel of the State forest districts.

On 20,007 acres, 720,952 wild Ribes plants and 3,342 cultivated Ribes were removed and destroyed, protecting 2,266 acres of white pine from blister rust. In addition, 57,059 wild and 7 cultivated Ribes were removed in the reexamination of 38 areas containing 2,428 acres, of which 925 acres were of white pine. A total of 22,435 acres was examined, and 778,011 wild and 3,349 cultivated Ribes plants were destroyed during the season.

In cooperation with the Pennsylvania Department of Welfare, 2,055 wild and 52 cultivated Ribes plants were removed from lands adjacent to the forest nursery at Rockview. Reexamination of the sanitation zones at the four State forest nurseries resulted in the removal of 2,215 wild Ribes.

Adding the 1932 control results to previous years' records shows that Pennsylvania has, to date, covered in initial eradication 60,766 acres and destroyed 2,621,785 Ribes plants, and in follow-up work protected 5,016 acres. Initial work has been completed on State-owned lands in almost half the State forest districts. On privately owned lands the initial work is practically completed in four counties and has been started in four additional counties.

An arboretum has been established at Washington Crossing Park, N. J., through the generosity of Charles Lathrop Pack. It contains practically all of the trees and many of the shrubs native to New Jersey and will be known as the George Washington Memorial Arboretum.

A pound of red alder seed has been obtained by H. A. Smith, State forester of South Carolina, to be planted experimentally in the South Carolina State nurseries. This species has been of some use in Oregon in halting fires, according to J. B. Woods, forester of the Long-Bell Lumber Co. Its so-called fireproof quality is due to the fact that its broad leaves do not contain pitch and are therefore less inflammable than the needles of coniferous trees. The value of red alder for planting in firebreaks is being tested by the United States Forest Service in the Pacific Northwest region, but present indications are that its usefulness will be limited. It is doubtful, says Mr. Smith, whether red alder seedlings will stand the hot South Carolina summer. Even if the species will grow successfully in the South, it will be some time before its usefulness for firebreaks in that region can be determined.

Relief Work in Pennsylvania State Forests

Thirty-seven local relief projects, giving employment to about 400 men, are under way in the State forests of Pennsylvania. Various plans for furnishing employment and free fuel wood to those in need have been worked out by the district foresters in cooperation with local welfare agencies. Dead and fire-scarred trees are being removed from the woods, State-forest boundary lines and areas intended for roads are being cleared, and park areas are being improved.

New Protective Organizations in Georgia

Two new forest-protective associations have been formed in Georgia, one as a Timber Protective Organization with 11,946 acres of forest land listed and the other as a Forest Fire Fighters' unit with 603 acres. The larger organization is in Pierce County. The members of the other group are 11 negro property owners of Stewart County, who were organized for protection of their forest land from fire through the efforts of H. E. Hall, vocational agricultural teacher at Omaha, Ga.

Kershaw County, S. C., is the only county in the State and one of the very few in the United States to employ a full-time forester. Charles W. Nuite, who holds that position, occupies a joint office with the county agent, H. D. Green, an arrangement which contributes to effective cooperation with the State Extension Service. There are about 61,000 acres of actual and 2,000 acres of potential forest land under organized fire protection in Kershaw County, only about 2 per cent of which was burned over during the last 11-month period for which records are available. Slightly more than 50 per cent of all forest-tree seedlings planted in South Carolina last year were planted in Kershaw County, where 267,550 seedlings were set out.

Including a recent addition of 2,822 acres to the Bass River State Forest, New Jersey now has eight State forests containing 48,143 acres of land acquired at an average cost of $5.85 per acre.

New York State tree nurseries will be growing more than 100,000,000 forest trees annually by 1936, it is predicted.

Education and Extension

Sale of Pulpwood a Source of Cash to Louisiana Farmers

By Robert Moore, Extension Forester, Louisiana

Since 1930, farmers in Louisiana have been forced to supplement the returns from their regular operations, and pulpwood has offered a ready and obvious resource which is quickly converted into cash. Data on pulpwood purchases by Louisiana pulp and paper mills collected for the three years 1929–1931 show that the agricultural depression, the low price of farm products, and the drop in price of pulpwood have not halted but, on the contrary, have stimulated the cutting of farm pulp timber.

In 1929 the seven mills in Louisiana paid in cash $1,650,600 to farmers, either directly or through contractors who purchased directly from the farmers. Pulpwood was bought in 16 of the 64 parishes of the State. In 1930, although one mill closed down during the year, the purchases from farmers dropped to $1,559,863, a relatively insignificant decrease compared to the drop in the returns from other farm products. During 1931 total cash receipts suffered a further decline to $1,452,928. However, for the mills in operation during both 1930 and 1931, the cash expenditure for pulpwood in the latter year actually increased over that in 1930 by approximately $4,000.

The Louisiana pulp mills, recognizing the financial condition of the farmers, in many cases increased their purchases, having suspended cutting in their own timber. One concern gave preference to farmers who were certified by the county agricultural agents as being in particular need of money. This plan seemed to meet with general approval. The same mill increased its purchases in 1931 by almost 10,000 cords, while another mill doubled its purchases. In fact, not one mill decreased the quantity of pulp bought from farmers in spite of the slump in the paper business.

The deepening of the depression was reflected in changes in both price per cord and in the size of the cord. In 1929 practically all purchases were on the basis of the standard cord of 4 feet by 4 feet by 8 feet, and the price was uniform at $5 per cord. In 1930 price reduction was the policy. The price went as low as $4.48 at one mill, and only two mills maintained the 1929 scale of prices. In 1931 price cuts became a serious factor in the pulpwood situation. One mill dropped the price to $3.25 per standard cord, another to $4.50 and then to $4. Late in the year this latter mill, after a conference with some of the principal farmers of the area, decided to add 6 inches to the length of the stick instead of lowering the price again. This was equivalent to a 12½ per cent cut in price. The mill buys from 80,000 to 90,000 cords per year.

Though such prices for pulpwood as quoted seem ridiculously low, they compare favorably with prices now received for other farm products. Cotton sold for 19 cents a pound in 1929 and for 6 cents in 1931. Eggs dropped from 36 cents a dozen to 23 cents, and then to 10 cents, butterfat from 35 to 26 cents per pound. The Bureau of Agricultural Economics price index shows all farm products at 138 in 1929 and 86 in 1931. In the light of these reductions, the decrease in pulpwood prices does not seem excessive. Farmers were and are anxious to cut and sell pulpwood almost without regard to profit, so great is their need for cash income. As one farmer put it, "If we can sell pulp timber it will beat Government help."

Tree-Planting Aids in Control of Michigan Sand Dune

Shifting of the sand of a huge dune at Saugatuck, Mich., which was encroaching on the channel of the Kalamazoo River and threatening property near its base, has been definitely stopped through plantings of trees with brush spread between the rows. No further trouble is expected from moving sand.

The dune, known as Old Baldhead Mountain, is 300 feet high and covers 4 acres. R. F. Kroodsma, extension forester of Michigan, was called in by the city for advice on controlling the sand, and on his recommendation planting was begun in April, 1931. Seedlings of black locust, honey locust, ponderosa, white, Norway, jack, and pitch pines, and large cuttings of willow and poplar were used. Carloads of brush were hauled up by cable and spread over the sand between the trees. Additional planting was done in the spring of 1932. There has been a splendid survival of the planted trees and considerable natural weed growth has come in over the dune. The mat of brush stopped the shifting of the sand and the growth of the trees and weeds is expected to make fixation permanent.

Fifteen hundred vocational agricultural students in South Carolina are studying forestry and practicing it upon some 60 demonstration forests in the State. County farm demonstrations of firebreak construction, thinning, forest improvement, and tree planting are to be held in each county this winter in cooperation with the South Carolina extension service, and forestry exhibits will be put on at 15 fairs.

Oratory Contests Effective as Fire Prevention Measure in Tennessee

By Tom B. W. Watkins, District Forester, Tennessee

A reduction in area burned in Fentress County, Tenn., from 3.03 per cent of the county's total area in the spring of 1928 to 1.7 per cent in the spring of 1932 is attributed by many of the large landowners of the county to the educational effectiveness of the three oratorical contests on the subject of forest-fire prevention held in the county schools in the last four years. Fire weather in the two seasons was practically identical.

Three hundred and sixty pupils of the seventh and eighth grades entered the 1932 contest and received special literature to assist them in preparing their talks on "What well-protected forests will mean to Fentress County." The finals were held at the Alvin C. York Agricultural Institute at Jamestown, and Coram Larue, of the Banner Springs School, was awarded the first prize of $10. Other prize winners were Clara Upchurch, of the Forbus School, $6; Rose Threet, Buffalo Cove School, $4; Christine Storie, Oak Grove School, $3; and Joe Wheeler, York Elementary School, $2. The judges were James O. Hazard, State forester, and Mr. and Mrs. W. T. Walton, of Rugby, Tenn. The cooperation of O. O. Frogge, superintendent of Fentress County schools, made possible the success of the contest.

Forestry Classes for Adults Introduced in Georgia Schools

Forestry classes for adults to be held at night in 20 to 30 vocational agricultural schools in Georgia are being inaugurated this winter. The classes will be conducted by the vocational teachers with the assistance of the district foresters. Subjects to be taught are reforestation, fire protection, thinning, wood utilization, and, in south Georgia, turpentining methods. If the work proves successful, it will be extended to all vocational agricultural schools in the State.

An intensive training course in practical forestry for Georgia boys who have demonstrated by their knowledge and accomplishments that they have a special interest in the subject is described in a pamphlet, "The Vocational Forestry Camp," prepared by Paul W. Chapman, Director of the Division of Vocational Education of Georgia, and issued by the division. This camp, held annually for a period of three weeks during July and August, is part of Georgia's "unique and practical method of teaching forestry to farm boys." The camp program of practical courses, field work, excursions, athletics, entertainments, and awards has been very successful and is described here in detail. Boys from vocational schools in every county in the State who are most interested in forestry compete for the privilege of attending the camp.

St. Lawrence University Establishes New Demonstration Forest

A third demonstration forest area has recently been established by the department of forestry of St. Lawrence University, Canton, N. Y. The tract consists of 204 acres of typical abandoned farm land located between Mannsville and Sandy Creek, N. Y., on the main highway from Watertown to Syracuse. With a frontage of half a mile on the westerly side of one of the main roads leading into the Adirondack region, the forest is advantageously located for demonstration purposes.

The primary object in the development of the tract will be to demonstrate the feasibility of the reforestation of similar areas by private individuals, corporations, and municipalities. Approximately 150,000 trees will be planted on open land on the tract next spring. All species adapted to the region will be used in these plantings, so that those contemplating similar projects will have an opportunity to observe the development made by the trees in which they are most interested.

A 50-acre stand of mixed hemlock and hardwoods, typical of many northern New York farm woodlots, will be improved to demonstrate ideal farm-woodlot conditions.

A natural grove of white pine adjacent to the road will be developed as a picnic ground. Roadways will be built through the tract to enable visitors to reach easily all points of interest.

Minnesota 4-H Club to Develop Arboretum

A 4-H forestry club group of 21 boys at Virginia, Minn., is developing an arboretum on a tract of more than 4 acres made available to it by the Daughters of the American Revolution. The project is under the direction of Parker Anderson, extension forester of Minnesota. The area has been named the George Washington Bicentennial Arboretum at a dedication ceremony held October 24, 1932.

The tract is divided naturally into two parts—one a grove of about 3 acres containing various tree species, and the other a small piece of wasted, rocky land. According to the club's plans, the larger part is to be used as an informal forestry demonstration area, on which the stand will be thinned and the better trees encouraged. The formal arboretum will occupy the rocky land, which will be divided into about 40 small plots where every species of tree native to the region will be planted.

Idaho University Receives Experimental Forest

A forest tract of 3,646 acres on Moscow Mountain, Latah County, Idaho, presented to the University of Idaho by the Forest Development Co., was accepted for the university by the State board of education on November 13, 1932. The area is to be used as an experimental forest by the school of forestry of Idaho University, under the direction of Dean F. G. Miller.

In making the presentation, J. P. Weyerhaeuser, jr., of whose interests the Forest Development Co. is a subsidiary, described the forest as follows:

"The area is reasonably compact. All age classes of all species of timber common to the northern part of Idaho are found on almost every possible exposure. The timber has only been partially removed and slash from logging operations has been handled in various manners with various results. All in all, we think there is here, remarkably close to your campus, a forest laboratory of very considerable educational value."

Help in Relief Projects Offered by New York State College in Bulletin

A plan for unemployment relief through the use of the woodlands of New York has been published by the New York State College of Forestry, Syracuse University, in bulletin form. The cutting of fuel wood by those out of employment and the supplying of the wood to needy families throughout the State is suggested to mayors of cities, county boards of supervisors, masters of State granges, farm bureau agents, and woodland owners. The plan comprehends the donation or purchase of forest areas and the harvesting of wood in a manner that will not only supply fuel but improve the stand. Most of the woodlands of the State can be improved and their value increased by the removal of defective trees.

The college offers to furnish up to 100,000 young trees under specified conditions at the rate of not more than 5,000 for any one project. The assistance of the forestry staff in planning relief projects and in marking sample areas to guide the selection of trees to be cut is also offered. The supervision of the actual operation, however, must be taken care of by local agencies.

Identification of tree and plant species of southern Florida for the benefit of the public has been undertaken by the forestry and botany departments of the University of Miami. A room in a university building has been assigned to this identification service and specialists will be in attendance there from 3 to 4 p. m. daily. Injured trees in the Miami area will also be inspected and treatments suggested. The work is part of the university's tropical research program.

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Forestry-Demonstration Team Wins State Contest

By Charles A. Gillett, Extension Forester, Arkansas

A 4-H club demonstration team composed of Cecil and Curtis Davis of Redfield, Jefferson County, Ark., won the State championship demonstration contest held during farmers' week at the University of Arkansas with a demonstration on forest fire prevention. About 48 teams competed in the contest. The demonstration was seen by approximately 2,500 persons during farmers' week, and was also given before two luncheon clubs at Pine Bluff, Ark., and before a large group of farmers from Mississippi stopping over in that city.

The boys demonstrated the use of fire lines by means of a miniature forest on an inclined plane. A fire line was constructed through the middle of the little forest and a fire started on one side, which the fire line stopped. Equal amounts of water were then poured on the burned and unburned areas. The water immediately ran off the burned-over side, carrying with it an appreciable amount of soil, while on the unburned forest the water dripped off more slowly and carried no soil particles.

Pennsylvania's first 4-H forestry clubs were organized in 1932 by Extension Forester F. T. Murphey and his assistant, W. I. Bull. Two clubs, having 28 and 17 members, respectively, were formed and began their first year's work, which consists of tree identification and collection of wood specimens and tree seed. For the second year the growing of seedling trees in home nurseries is scheduled.

Prizes totaling $25 are being offered by J. S. Green, a naval-stores operator of Butler, Ga., to public-school students of Taylor County for the best essays on forestry. W. A. Lundy, the county agricultural agent, is planning the contest. Mr. Lundy is also expecting to assist landowners of the county to plant 100,000 trees on idle lands this spring.

A well-equipped building of two stories, basement, and attic has recently been completed for use by the divisions of entomology and beneficial insect investigations of the southern branch of the University of California. Laboratories and offices occupy the main floors of the building, while in the attic is a greenhouse for growing plants and propagating insects.

Forest Service Notes

The Use of Fertilizers in the Forest Nursery

By J. H. Stoeckeler, United States Forest Service

Production of hardy, well-balanced stock at less cost per thousand trees should be the result of proper use of fertilizers in the forest-tree nursery. The following discussion of treatments that have been used successfully, the factors influencing their efficiency, and those to be considered in their use is based upon a study of the literature on the subject and of the answers to a questionnaire sent to a dozen of the leading commercial nurserymen in the United States.

In selecting a method of fertilization the nurseryman must consider first the effectiveness of the treatment in producing a plant which will survive adverse field conditions successfully. Then the item of cost must be balanced against the results obtained. The effect of the treatment in relation to the sustained productivity of the soil, the type and condition of the soil, the age of stock, and the species are other factors which must be taken into account in evaluating the efficacy of fertilization.

Which fertilizer will be most effective for a given nursery can not be definitely predicted, but certain principles have been established which will apply to all nursery practice. It has been generally conceded that bulky fertilizers containing considerable organic matter invariably produce excellent results. Among these are animal manures, raw humus or leaf mold, and compost. In many cases it has been found that liberal use of such materials as charcoal and sand have improved growth more than fertilizers which supplied only plant food. Soiling crops such as soy beans, cow peas, buckwheat, rye, and clover not only furnish plant food for succeeding nursery crops but also add large quantities of humus to the soil.

Complete or balanced chemical fertilizers have shown better results than those supplying only one plant-food element. By the term "complete fertilizer" is meant one which contains the three elements which are most likely to be deficient in the soil—nitrogen, phosphorus, and potassium. Calcium is a fourth element necessary for plant growth, but most soils have it available in amounts sufficient to supply coniferous nursery stock. Nitrogen is useful primarily in stimulating top growth, while phosphorus shows a marked effect on root growth. The effect of the addition of a fertilizer must be considered in relation to the elements which may be present or lacking in the soil.

Each nursery presents its own problem in connection with fertilization. Some soils lack only one element; in others there may be a deficiency in several. A fertilizer used successfully in one nursery may not prove of much value in another, even though growth conditions appear to be the same. A thorough physical and chemical analysis of the soil may be valuable in indicating what treatment is most likely to be successful. However, the only sure method of determining the kind and amount of fertilizer to be used is to experiment with a number of them on a small scale to ascertain which is most effective. As a criterion of success one may use field survival, total weight of the plant, top-root ratio, or any other factor which may seem desirable.

A few of the many treatments which have yielded excellent results are listed below:

(1) A mixture of 600 pounds of superphosphate, 300 pounds of ammonium sulphate, and 300 pounds of muriate of potash per acre.

(2) For second-year seed beds: 4 ounces of nitrophoska dissolved in 3 gallons of water applied in the spring to 48 square feet of pine or spruce seed beds; six weeks later 3 ounces of urea applied in the same manner.

(3) For second-year transplants: 1 pound of nitrophoska applied to 100 square feet of bed, and 1 pound of urea six weeks later.

(4) A mixture of 268 pounds of 15 per cent sodium nitrate, 178 pounds of 40 per cent potash, and 892 pounds of 17.5 basic slag per acre.

(5) Use of 30 pounds of sheep manure on 48 square feet of seed bed.

(6) For spruces: 1 pound of dried blood and 2 pounds of ground bone on 48 square feet of seed bed.

(7) For pines: 2 pounds of dried blood and 1 pound of bone meal per bed of 48 square feet.

(8) For 2–0 spruces: ½ to 1 pound of sodium nitrate as a top dressing to 48 square feet of seed bed.

(9) A 5–8–7 combination (ratio of nitrogen, phosphorus, and potash, respectively) at the rate of 1,200 to 4,000 pounds per acre.

(10) For conifers generally: 2 pounds of ammonium sulphate dissolved in 10 gallons of water to 30 square feet of seed bed.

(11) Soiling crops in combination with a heavy application of fertilizers. (Soybeans, cow peas, buckwheat, rye, and clover have been used successfully.)

(12) Heavy treatments of well-rotted stable manure.

(13) Stable manure or commercial fertilizer composted with raw humus or peat treated with lime.

(14) Lime on very acid soils.

In applying fertilizers some important factors must be kept in mind. The age of stock makes a difference in the results obtained. Practically all investigators agree that first-year seedlings fail to show much response to chemical fertilizers of any kind because these seedlings draw a considerable portion of their food from

the cotyledons and any additional nutrients needed can be drawn as easily from unfertilized as from the richer soil. Therefore, if seed beds are to be treated, a very soluble fertilizer should not be applied the first year because considerable loss by leaching will be incurred. This is especially true of the highly soluble nitrogenous fertilizers on light sandy soils or those with a porous subsoil.

In regard to the time of application, authorities agree that highly soluble fertilizers are applied most advantageously in the spring or early summer. If the treatment is made later, the stimulus tends to form soft growth late in the season, which lacks maturity and consequently is susceptible to frost and drought and does not keep well in storage.

Conifers seem to be more sensitive to some types of fertilizers than ordinary truck or field crops. There is a possibility of direct chemical injury or, indirectly, of increased susceptibility to disease. From a survey of past experience, it seems to be a relatively simple matter to determine which fertilizers should be applied lightly or even entirely avoided. For instance, most fresh manures should not be applied directly; they should be composted with sand, raw humus, or peat treated with lime. Well-rotted manures can be used safely.

Heavy applications of such fertilizers as dried blood, bone meal, sodium nitrate, and lime have in some instances caused an abnormal loss through damping off. Usually the highly concentrated nitrogen carriers have caused the most serious losses. Such damage can be avoided by using medium or light applications.

These same nitrogen carriers have in a few instances caused an undesirable top-heaviness. In most cases this was more than offset by the general superiority in size, color, vigor, and field survival of the fertilized trees. Top-heaviness can be minimized by the use of a complete or balanced fertilizer.

The excessive use of lime may cause damage by damping off because it provides a good medium for the fungi to live in. Lime, however, is usually not necessary in the forest nursery except on the more acid soils.

Water in connection with fertility experiments must be carefully controlled because, other conditions being equal, heavy watering causes a stimulation of growth, particularly of the tops.

By Executive proclamation of October 20, 1932, President Hoover transferred to the Yellowstone National Park approximately 7,600 acres of land along the Yellowstone River previously a part of the Gallatin National Forest, Mont. This transfer was pursuant to an act of Congress of May 26, 1926, authorizing the President to add to the park certain lands in the State of Montana referred to therein. The object is "the preservation and protection of the wild game" of whose winter range the area is an important part.

Osceola Forest Records Show Cost of Thinning Longleaf Pine

By James G. Osborne, United States Forest Service

Records of a timber-thinning operation carried out in February, 1932, on the Osceola National Forest, Fla., give turpentine operators a definite basis for estimating how much it will cost them to thin young stands of second-growth longleaf pine. Many operators have known for years the advantages of thinning such stands, but until recently they have had very little information as to the cost involved.

Because trees in crowded stands compete with each other for soil moisture and for light, they can not grow so fast as if they were allowed more space. From tests carried out by foresters and from experience, turpentine operators know that the faster-growing trees produce the greater yields of gum and that a tree's capacity for producing gum increases as the tree increases in size. They recognize, also, that if a pine stand is thinned at an early age it reaches turpentining size from 10 to 15 years sooner, and that this means earlier returns on investment.

The turpentine operator is in a particularly good position to thin timber economically. Turpentining is a seasonal operation; usually the work is confined almost entirely to the nine months March to November. The winter months, fortunately, are the season when thinning can be carried out with greatest benefit to the trees. In addition, the turpentine operator has a continuous need of still wood, which can be met in part with thinnings. (It is possible that a new market for thinnings will soon be created by the advent of pulp and paper mills in the South.)

Thinning costs divide readily into overhead and labor costs. The former, representing transportation, tools and supplies, supervision, and the time spent by the operator in planning, may be considered as fixed, since they do not vary with the character of the stands to be thinned. These costs depend to a large extent upon the character of the available transportation facilities, the distance of the stands from the camp, and the availability of tools and of foremen who must be retained regardless of the quantity of out-of-season work. Labor costs, on the other hand, vary considerably with the character of the stands thinned. The data on thinning costs that were taken on the Osceola National Forest, by foresters of the Southern Forest Experiment Station, do not merely show the labor cost of thinning on the average acre, but show how much time of laborers was spent on each part of the thinning operation. They thus provide a basis for cost computation that does not fluctuate noticeably between regions and that is independent of local wage differences.

The thinning operation studied reduced the stand per acre to 200 trees. The largest and in general the best-formed and most evenly spaced trees were chosen

to be left standing. No tree more than 6 inches in diameter was cut.

The longleaf pine stands on the study areas were of two age classes, 25 years and 35 years. For the 25-year-old stand the data were taken on an area basis, on six 1-acre plots. Records covered diameters of trees cut, number of trees per acre, chopping time, "other than chopping" time (including time required for planning and for walking between trees), and total time. For the 35-year-old stands the chopping time and diameters only were recorded, no plots being established. Data were collected on about 2,000 trees in the 25-year-old stands and about 1,500 trees in the 35-year age class.

Chopping time per tree was found to increase rapidly with size of tree, but varied considerably within each diameter class. The mass of the data, however, was sufficient to make the average figure for each class reliable.

It was found that on the average the time required for felling a 4-inch tree 35 years old was approximately one and one-half times as great as that required for felling a 25-year-old tree of the same size. A tree 1 inch in diameter required 1.11 seconds to fell in the 25-year-old stand and 1.33 seconds in the 35-year-old stand; a 2-inch tree, 1.975 and 3.046 seconds, in the two stands, respectively; a 3-inch tree, 7.28 and 10.65 seconds; a 4-inch tree, 14.40 and 22.25 seconds; a 5-inch tree, 22.44 and 35.75 seconds; and a 5.75-inch tree, 28.73 and 41.36 seconds in the 25-year-old and 35-year-old stands, respectively.

The fact that more time was required to chop the 35-year-old trees was attributed to the closer grain and greater hardness of the wood of these older trees, which had grown more slowly than the trees of the 25-year-old stand.

Average chopping time per tree corresponded rather closely with average diameter of the trees cut, within each age class, and was wholly independent of the number of trees removed per acre. These facts are brought out by data presented in the following table, representing four plots:

Number of trees removed per acre	Total time required to thin acre	Average diameter of trees cut	Average chopping time per tree
	H. m. s.	*Inches*	*Seconds*
883	4 13 28	2.59	7.02
390	1 25 15	2.05	3.82
431	1 33 44	2.58	7.07
222	47 10	2.38	6.36

"Other than chopping" time, also, was found to be independent of the number of trees removed per acre. It would seem natural that on plots where the number of trees per acre was greater, chopping should require more time and walking should require less; but this reasoning was not supported by the data. Data for four plots show that "other than chopping" time was greatest on the densest acre and least on the acre ranking second in density. The figures are: 883 trees removed per acre, 10.2 seconds per tree; 390 trees, 9.3 seconds; 431 trees, 6 seconds; and 222 trees, 6.4 seconds. The average "other than chopping" time per tree for the four plots was 8.64 seconds.

The labor costs per acre for thinning the 25-year-old stand, with wages $1 per 8-hour day, were as follows: 200 trees removed per acre, 10 cents; 400 trees, 17 cents; 600 trees, 28 cents; 800 trees, 43 cents; and 1,000 trees, 68 cents. These cost data represent six 1-acre plots. (The costs were read from a curve of total time per acre over number of trees removed per acre.) The figures are necessarily dependent upon the diameter distribution in the stands studied and hence can not be applied universally. A good estimate of thinning costs for any second-growth longleaf pine stand can be obtained by cruising the area and applying the averages for chopping time per tree together with the average figure for "other than chopping" time, or 8.64 seconds.

Experiments Revive Hope for Broadcast Seeding

Direct seeding with forest-tree seed, in spite of a history of repeated failures in the United States, may have possibilities of success here under certain conditions. Seeding has the advantages of making possible a much more flexible reforestation program and of allowing a natural development of the root system of the trees from the start. The method has been used successfully for many years with conifers in Euope and to some extent in Canada.

Experiments with direct seeding under way on the Olympic National Forest, Wash., in cooperation with the Pacific Northwest Forest Experiment Station are producing some surprising results. Sample areas on a 1928 burn were seeded in January, 1929, by L. A. Isaac, using 1.6 pounds of Sitka spruce, western red cedar, and western hemlock in mixture. In 1932 these had an average stand of 2,800 seedlings per acre. Parts of the same burn seeded in January, 1930, with 2.24 pounds of mixed seed per acre now show 1,900 seedlings per acre. The results of the January, 1931, and January, 1932, seedings on the same burn were very much poorer and did not produce satisfactory restocking on most plots. However, 1931 seeding on a fresh burn at the rate of 2.4 pounds per acre produced 1,800 seedlings, and the 1932 seeding on a new burn shows an even larger number. Another recent burn on moist ground seeded to red alder in January, 1932, now has 13,600 seedlings to the acre, and an adjoining, gravel-surfaced abandoned roadway has 25,000.

These results seem to indicate that adequate restocking can be obtained in the northwestern fog belt by seeding the first or second year after a fire with 1.5 to 2.5 pounds of seed per acre of small-seeded species.

On the Chippewa National Forest, Minn., the Lake States Forest Experiment Station also has been carrying

on direct seeding experiments in the past few years. Hardly L. Shirley, of the station, believes that these experiments have yielded information that may lead to the development of successful methods. Since most of the work has been done in the last two seasons, which were unusually dry, equal or greater success may be reasonably expected under more favorable conditions.

Seeding in prepared spots was tried out on the Chippewa Forest in aspen, brush, grass, and jack pine cover types, with seed of Norway, white, and jack pines, and white spruce. The aspen sites proved to be least favorable. Even where seedlings came in, the first season's growth was poor and only an occasional one survived the winter. The competition of the brushy and herbaceous understory in aspen stands is ordinarily too severe for either seeding or planting to be successful. The results on brush lands were slightly better, but here also competition was too keen for satisfactory growth. In the grass and sedge type the seedlings have abundant light but are subjected to root competition and to the drying and heating effect of direct sunlight. Yet, in spite of the drought, more than 20 per cent of the spots in this type contained seedlings. Compared with 50 per cent survival of 1–1 Norway pine stock planted in the spring of 1931 on plowed land, this result is not so discouraging. Best results were obtained in jack pine, where there was less plant competition.

Of the four species tried, jack pine proved most successful, due in part to the small size of the seed which enables it to escape the attention of seed-eating birds and rodents. Of 312 spots screened against birds and rodents, 63 per cent had seedlings, whereas only 19 per cent of 2,648 unprotected spots were occupied. Coating the seeds or spraying the spots with repellents did not afford protection, nor did the distribution of poisoned bait prevent the destruction of seed.

The work in Minnesota thus far indicates that direct seeding may have useful possibilities in the Lake States if areas to be seeded and species to be sown are carefully selected and the seed protected from birds and rodents.

White Pine Stumpage Prices in the Northeast in 1931

By Henry B. Steer, United States Forest Service

Data on northern white pine stumpage prices for the calendar year 1931, obtained through the cooperation of the division of manufactures of the Bureau of the Census, have been compiled by the division of forest economics of the Forest Service in continuation of a similar compilation for the years 1926–1930, given in the November, 1931, issue of the Forest Worker. To obtain as complete reports as possible in view of the unusual business conditions prevailing in 1931, the canvass of the Bureau of the Census was augmented by requests for reports from a carefully prepared mailing list of several hundred known owners or buyers of New England stumpage. Averages are based on replies received from a total of 409 firms or individuals, involving 123 transactions and more than 35 million board feet of white pine stumpage.

Only about half as much white pine stumpage was reported sold in 1931 as in 1930. Many of the firms and individuals reported that they had bought or sold no timber during the year. While a few sales of virgin timber were reported, by far the greater part of the timber involved was second growth.

Prices of all white-pine stumpage reported sold in New England and New York in 1931 in pure stands or in mixed stands in which it was treated as an individual species are given in the following table:

State	Number of transactions	Volume of stumpage sold (1,000 board feet)	Value	Average price per 1,000 board feet	Price range
Connecticut	3	885	$4,175	$4.72	$4.00–6.00
Maine	30	15,406	111,800	7.26	3.50–14.00
Massachusetts	36	6,391	47,581	7.45	2.50–11.10
New Hampshire	39	11,705	64,774	5.88	2.00–9.75
New York	7	446	3,507	7.86	4.50–15.00
Rhode Island	2	501	2,508	5.01	4.00–8.00
Vermont	6	216	2,079	9.63	6.00–12.00
Total and average	123	35,550	236,424	6.65	2.00–15.00

Following is an analysis of 1931 sales by price-range classes:

Price-range class	Number of transactions	Volume of stumpage sold (1,000 board feet)	Value	Average price per 1,000 board feet	Percentage of total number of reports	Percentage of total volume reported sold	
						1931	1930
$2.00–$2.99	2	275	$675	$2.45	2	1	(1)
$3.00–$3.99	6	2,395	7,894	3.30	5	7	2
$4.00–$4.99	15	3,463	14,214	4.10	12	10	3
$5.00–$7.49	48	17,015	104,352	6.13	39	48	30
$7.50–$9.99	41	10,728	91,226	8.50	33	30	16
$10.00–$14.99	10	1,669	17,988	10.78	8	4	46
$15.00–$19.99	1	5	75	15.00	1	(1)	3
Total and average	123	35,550	236,424	6.65	100	100	100

[1] Less than one-half of 1 per cent.

Reports of a few sales of white-pine stumpage in New England for less than $4 per thousand board feet were made in 1931, but such sales formed only a small percentage of the total number; 82 per cent by volume of the white pine was sold at prices greater than $5 per thousand feet.

The decline in white-pine stumpage values during the past three years has not, in fact, been as severe as that in prices of most other commodities. This is indicated by the following comparison between stump-

age prices of white pine in New England and the average wholesale prices of all farm products, of hides and skins for tanning, of cotton textiles, and the purchasing power of the dollar, as compiled by the Bureau of Labor Statistics of the United States Department of Labor,[2] on the basis of 1926 values as 100 per cent:

Year	White pine stumpage prices	Wholesale prices of all farm products	Wholesale prices of hides and skins	Wholesale prices of cotton textiles	Purchasing power of the dollar
1926	100.0	100.0	100.0	100.0	100.0
1927	108.7	99.4	120.4	97.9	104.8
1928	107.1	105.9	148.6	101.2	102.4
1929	90.3	104.9	112.7	99.4	103.6
1930	95.4	88.3	91.0	87.4	115.9
1931	76.2	64.8	60.2	71.3	140.6

Latest Additions to List of Primitive Areas

With the approval in October, 1932, of eight additional tracts as primitive areas, the total number of such areas set apart within the national forests to be preserved in their natural wild state so far as possible becomes 54. A total area of 9,018,298 acres of national forest land and 221,107 acres of other land is now contained within these tracts. Logging is limited in all these wilderness regions, the timber in some of them being inaccessible for commercial use though valuable for watershed protection.

The most recently designated primitive areas are as follows:

Galiuro Primitive Area, Crook National Forest, Ariz., 50,200 acres.

Mount Baldy, Apache National Forest, Ariz., 7,400 acres.

La Garita-Sheep Mountain, Cochetopa National Forest, Colo., 38,030 acres.

Wilson Mountains, Montezuma National Forest, Colo., 27,347 acres.

San Juan, San Juan National Forest, Colo., 238,080 acres.

Beartooth, Custer and Absaroka National Forests, Mont., 230,000 acres.

North Absaroka, Shoshone National Forest, Wyo. 379,460 acres.

South Absaroka, Shoshone National Forest, Wyo., 613,708 acres.

Southern Hardwood Lumber to be Studied by Laboratory

A program of research in southern hardwood lumber has been undertaken by the Forest Products Laboratory of the United States Forest Service. Requests for such a study were made by the Hardwood Manufacturers' Institute and the Memphis Lumbermen's Club.

The four chief aims of the study are: (1) To provide consuming industries with specific information on working and machining characteristics of the different southern hardwood species; (2) to find out whether there is any better way of seasoning hardwoods than that now used, particularly in the case of oak; (3) to determine the dividing line in size and grade between logs that pay their own way in logging and milling under typical southern hardwood conditions and those that do not; and (4) to determine whether the properties of the more variable woods are governed principally by the growth conditions surrounding the individual tree or by the characteristics of the species as a whole.

General Forest News

How Old is a Longleaf Pine?

By L. J. Pessin, United States Forest Service

Foresters working in the South have made many vain attempts to determine the age of individual longleaf pines in the seedling and later stages. Whereas the other southern pines begin height growth immediately after germination, the longleaf pine remains for an indeterminate period of years in the stage in which it is scarcely distinguishable from surrounding grass. It develops so-called "primary" leaves just before the cotyledons fall off; that is, from one to two months after germination. At the end of the first year the first foliage leaves have appeared. Height growth of the stem may begin as early as when the tree is only 3 years old; on the other hand, cases have been observed in which the beginning of height growth was delayed until the age of 15 years. (The maximum duration of the delay is not known.) Observations and experimental results thus far fail to indicate what causes height growth to begin. The determining factor most certainly is not age, for seedlings of the same age on the same site have been known to vary in height from the "grass stage" to 8 feet or more. Factors that may work together in delaying the beginning of height growth are soil characteristics, the brownspot needle disease, competition for soil moisture, and fire.

Until recently in estimating the age of longleaf pines foresters in the South have followed the very inaccurate practice of assuming that the seedling requires seven years to grow so tall that a diameter measurement can be made at breast height (4½ feet).

[2] Wholesale Prices, 1930 (Bulletin 543); and Wholesale Prices of Commodities, December and Year 1931.

Recent anatomical studies have shown that the age of longleaf pine can not be determined with any degree of accuracy through ring counts. Irrespective of age, while the seedling is in the grass stage no marked distinction exists between the wood formed in the spring and that formed in the summer; although the stem may grow thicker from year to year, the tissue formed in a given season or year is indistinguishable from that previously formed. Rings in the stem or in the root of longleaf pine, therefore, indicate only the number of years that have elapsed since height growth began.

The fact that growth rings are not formed by longleaf pine in the grass stage may be due to the nonexistence of definite growing and dormant seasons for seedlings in that stage. It seems that such seedlings send out leaves whenever weather conditions are favorable, regardless of the season. Longleaf pine seedlings of different ages in the grass stage have been observed to send out needles at various times within the winter months. Seedlings that have begun height growth have definite active and dormant seasons, growing rapidly in the early spring, slowing down considerably toward the end of summer, and remaining inactive during the winter. The result is a distinct differentiation of woody tissue into spring and summer wood.

An 8-Year Campaign Against the Mountain Pine Beetle

By F. P. Keen, United States Bureau of Entomology

A fight of eight years against the mountain pine beetle in Crater Lake National Park seems at last to have been won by the National Park Service with the cooperation of the Bureau of Entomology and the Forest Service. In 1925 a tremendous mountain pine beetle epidemic swept down from the north, killing the lodgepole and western white pines as it went and threatening total destruction to stands of these species in Crater Lake National Park. These epidemics often sweep over large tracts of timberland, killing thousands of trees as they go. In advance of the main swarm of insects, new centers spring up and grow in size until the arrival of the main body, when they give impetus to the forward surge. To destroy the beetles in the main area of the infestation was financially out of the question, but these isolated attack centers could be cleaned up in the hope that the main invasion would not cross certain natural barriers. This control strategy was adopted by the Park Service with the help of the Bureau of Entomology, and the lodgepole pine stands in the Sand Creek and Anna Creek drainages were freed from local centers of infestation. The effort was successful in stopping any increase from these points, but the next year a vast swarm of beetles migrated from the main centers to the north into one of the recently cleaned units. The newcomers were also destroyed and the area cleaned up anew, but each year beetle invasion had to be repelled, while the main epidemic continued in the stands north of the lake, killing more and more of the trees.

By 1929 the main body of the epidemic had swung around the lake both to the east and the west. The menace to the southern stands was greater than ever. That year marked the crisis in the control battle, with 26,660 infested trees burned and $21,073.84 spent in control work. By 1930 the main infestation to the north, west, and east had practically burned itself out, leaving a forest of snags. The influx of beetles into the southern stands lessened and each unit covered by control work in 1930 and 1931 showed a consistent 75 per cent reduction in infestation, with little or no reinfestation through migration.

The campaign in the spring of 1932 marked the final step in the war against the beetles. The work was spread over 30,000 acres and 20,311 trees treated. Old epidemic centers were entered and the beetle broods struggling for existence in surviving trees were destroyed. Nothing was overlooked in the final clean-up of the southern half of the park and immediately adjacent national forest lands. The only survivors swept on past the park to a stand of lodgepole pine to the southeast. These are not expected to return.

Many trees were killed by the beetles and by control burning, but enough were saved to make the battle well worth while. As a result of the campaign the following facts have been established: Epidemics of the beetle in isolated centers can be readily controlled, but reinfestation of cleaned areas will continue as long as there are infested areas close by; the amount of reinfestation will be determined by the magnitude of the main infestation, its proximity, and the direction of its spread.

In a note recently appearing in Ecology, I. T. Haig, of the Northern Rocky Mountain Forest Experiment Station, reports on a series of tests made by the station on the germination of seed stored in the duff. Results of these experiments show that about one-third of the viable seed germinate in the second year of duff storage, but because of unfavorable light and moisture conditions in a dense stand the resulting seedlings die almost immediately. Seed germinating in this manner before the area is cut or burned over are, of course, wasted so far as future regeneration of the stand is concerned. It is evident, says Mr. Haig, that this premature germination is one of the factors which determine how many of the seed of any one crop of cones will remain dormant in the duff until the removal of the overwood stand and hence be available in regenerating the area.

Fire Losses in Ponderosa Pine Prove Value of Protection

By I. V. Anderson, United States Forest Service

Ponderosa pine is no doubt the most important commercial pine west of the Great Plains. Its geographic range extends over a tremendous area. It is the principal timber tree of the Black Hills region of South Dakota, the lumbering centers of western Montana, south central British Columbia, Oregon and Washington east of the Cascade Mountains, California, Arizona, and New Mexico. The total volume of ponderosa pine contained within its commercial range is estimated at 251 billion board feet, a tremendous volume of timber compared with that of its only two western competitors in pine lumber markets, California sugar pine and Idaho white pine.

When the 19 billion board feet of virgin Idaho white pine and the 36 billion board feet of virgin California sugar pine are gone, there will still be an enormous supply of ponderosa pine. Just how long this supply will last is difficult to predict because of the various factors affecting the rate of cutting, which constitutes the greatest drain. During the past 10 years the annual cut of ponderosa pine has averaged 2,655,441,000 board feet. This, of course, includes only that volume being manufactured into lumber.

Insects, disease, and the elements are also important agencies that must not be overlooked in the annual drain on the supply of ponderosa pine timber. But when compared to those from fire, the normal losses from these agencies are relatively unimportant. Fire has in a sense been chiefly instrumental in the development of the composition and character of our virgin ponderosa pine stands as we find them to-day. Throughout the past two or three centuries fires have constantly occurred in stands ranging from seedlings to 600-year-old veterans. At regular intervals they have destroyed and damaged the young growth, leaving as survivors only the hardiest trees, many of which carry the scars of their struggle for existence throughout their lifetime.

At first thought the loss to the lumberman from fire may seem negligible. Usually not more than 5 per cent of the merchantable ponderosa pine trees are killed outright by a single fire, and rarely as many as 15 per cent, depending upon the severity of the fire season and the amount of underbrush, advance growth, and associate species present in the stand. These losses have sometimes appeared so trifling that the desirability of fire protection has been questioned. If the actual number of merchantable trees killed outright by the fire were a true measure of the damage, fire protection might be considered unprofitable on a strictly economic basis. But that is not the whole story. Quality depreciation in the wood of fire-scarred trees constitutes an additional and more serious loss in values.

In a study recently made in the ponderosa pine stands of western Montana, 6 treees out of 26 per acre showed visible signs of fire damage, principally in the form of fire scar. As would be expected, loss in value from fire for trees of different sizes increased with increase in size. Based on lumber prices prevailing in 1928, these six trees each suffered an average loss of $1.81 in lumber selling value. The average selling-value loss per acre would then be six times $1.81, or $10.86. This is not a theoretical loss but a measurable loss caused by recurring fires during the past century or so. Its importance and seriousness can best be illustrated by computing the loss sustained by a given logging unit.

The Camas logging unit on the Flathead Indian Reservation in western Montana contains approximately 120 million board feet of ponderosa pine on about 12,000 acres. This is a typical pine stand for the region, so it is assumed that depreciation from fires during the past century or so has been identical with the average. If this is true, the total fire depreciation of this logging chance during the past century or so has been $10.86 per acre, or $130,320 for the entire stand of timber.

Studies of rate of growth of ponderosa pine, after the virgin stand has been properly cut over leaving the young thrifty trees for a future crop, indicate that, with adequate fire protection, it will take 120 years to produce a second crop equal in volume to the original stand. According to Forest Service and timber protective association figures, 5 cents per acre over a long period will be ample for the best type of fire protection or $600 per year for this area. If adequate fire protection had been given this stand during the past 120 years, the total bill would be $72,000. It is an established fact that the best type of fire protection will eliminate practically all fire depreciation in ponderosa pine stands. The protection expenditure of $72,000 during the past 120 years would have saved values amounting to $130,320. Thus the net return from fire protection during the 120-year period could be computed as $58,320 in this logging chance.

These facts indicate that organized fire protection yields big dividends, even when considered only from the standpoint of depreciation in lumber values caused by fire scar in a certain proportion of the merchantable trees of the stand—a consideration that entirely overlooks damage to the future stand through death of young growth, loss in watershed protection values, and depletion of soil fertility. The foregoing example of loss from fire represents only a small area. The entire commercial range of ponderosa pine covers approximately 40 million acres scattered from British Columbia to the Rio Grande. Assuming that this vast area of timberland has suffered fire losses during the past two centuries in the same ratio as in the example cited, the total net loss chargeable to fire is $434,400,000.

Fire protection in ponderosa pine pays.

American Society of Arborists Organized

A new society "for the protection of tree life and the improvement of arboriculture" was organized during the 1932 meeting of the National Shade Tree Conference in Rochester, N. Y., in August. To be known as the American Society of Arborists, the new organization will be composed of regular members who have been engaged professionally in the care and protection of shade and ornamental trees for at least 10 years, honorary members, and junior members. The society plans to promote effective means for the protection of tree life, to disseminate information on trees, and to educate the public in matters of tree care.

Officers elected at the first meeting were Charles F. Irish, Cleveland, Ohio, president; O. W. Spicer, Stamford, Conn., vice president; Norman Armstrong, White Plains, N. Y., secretary-treasurer; and R. M. Weakley, Warren, Pa., and Vance I. Shield, St. Louis, Mo., members of the executive committee.

Fossil Pollen in Peat Deposits Reveals Forest Succession

Evidence that a coniferous forest once flourished in the region now occupied by Bryant's Bog, Cheboygan County, Mich., and was displaced by a deciduous forest has been revealed through a study of fossil pollen in the peat deposits of the bog made by J. E. Potzger, who carried on this work in 1931 at the Biological Station of the University of Michigan under the direction of F. C. Gates.

Bryant's Bog, near Douglas Lake, Mich., is evidently an old glacial kettle lake, approximately 65 feet deep. Though the pine type predominates over most of this region, the principal cover of the plain and upland adjacent to the bog was a virgin deciduous forest up to a few years ago, when the timber was cut. Peat from the bog was collected at 1-foot intervals to a depth of 20 feet, and specimens of the fossil pollen found in each layer were examined. Pollen of conifers was very scarce in the upper layers of the peat, deciduous pollen predominating to a depth of 8 or 9 feet. Assuming approximately 100 years for deposition of 2 feet of peat, the pollen record correlates with a ring count of the hardwoods of the region, made by Professor Gates when the trees were cut, which showed an age of about 400 years for the oldest trees. Below the 9-foot level coniferous pollen suddenly became dominant, indicating the possibility that a destructive factor aided in the displacement of the conifers.

Similar studies of pollen deposits in peaty bogs have been made in Ohio and Iowa by Paul B. Sears, of the University of Oklahoma, and George H. Lane, respectively. The combined results of their investigations reveal a succession backward from recent times with hickory predominating, through beech and other hardwoods, to pine, and finally to the first forest after the Ice Age, which was of spruce and fir.

Postglacial vegetation of northern Italy has been investigated by Paul Keller through similar pollen analyses. Present-day forests there were preceded by chestnut; beech, oak, linden, and elm in mixture; and pine, with which appeared some spruce and fir; to the earliest forest after the retreat of the ice sheet, which was composed of birch with some willow and pine. These findings tally with those in northern Europe except that the pine period there was followed by a Corylus period. Corylus in northern Italy reached a maximum of only 37 per cent.

A history of the climate of a region may be reconstructed through establishment of the predominating vegetative type for each period.

Naval-Stores Station Opened in Florida

Formal opening and dedication of the new naval-stores experiment station to be conducted by the Bureau of Chemistry and Soils of the United States Department of Agriculture took place November 18, 1932. The station is located at Olustee, Fla., 12 miles east of Lake City. In cooperation with the Florida Forest Service and the Southern Forest Experiment Station of the United States Forest Service, aid will be offered the naval-stores operators of the South in developing improved practices in accordance with the findings of the scientists at the new station.

Nearly 500 people attended the opening exercises, including representatives of southern forestry and naval-stores associations, the Florida Board of Forestry, the Bureau of Chemistry and Soils, the United States Forest Service, and the naval-stores industry.

The number of hunting licenses issued in the United States, including Alaska, dropped off in 1931, 561,308 fewer licenses being issued in that year than in 1930. The total number issued in 1931 was 6,342,626, against 6,903,934 in 1930. For 23 States the reports include combined hunting and fishing permits, but separately issued fishing licenses are not included. Revenues received by the States through the issuance of hunting licenses also declined, from $10,017,564 in 1930 to $9,867,352 in 1931. Owing to increases in the fees in some States, however, the total revenue was nearly $500,000 greater than that of $9,391,412 in 1929.

Continuation of the work of the West Coast Lumbermen's Association has been assured by the accession of 88 new mills to membership since May 31, 1932. The total membership now represents 84½ per cent of the productive capacity of the lumber industry in the Douglas-fir region.

Newsprint Less than Three Days from Standing Trees

"This paper made from pines standing in Richmond County three days ago!"

This statement appeared on the programs of a joint meeting of the civic clubs of Augusta, Ga., at which Charles H. Herty spoke on his success in making newsprint from the southern pines. A picture of the trees growing in the woods and one of the pulpwood piled up after being cut appeared on the program with the explanation that the views were taken only three days before and that the trees pictured had been converted into the paper on which the programs were printed.

It was actually only 48 hours from the time the pines were cut, under the direction of C. N. Elliott, district forester of the Georgia forestry department, until they had been made into white paper at the research pulp and paper plant at Savannah. In 60 hours the programs had been printed and distributed.

A forest of 324 acres, planted by the H. C. Frick Coke Co. of Scottdale, Westmoreland County, Pa., from 1906 to 1912, now contains many trees ready for cutting for mine props and lagging. The plantings were made under plans furnished by the United States Forest Service. Best growth was made by red oak and silver maple. Some of the 25-year-old stands of oak and maple recently examined were found to contain trees 50 feet high and 10 inches in diameter; most of the stands were 30 to 40 feet in height. Except where forest fires have invaded portions of the area, the plantings have proved commercially profitable.

Alarmed by the threat to the Philippine lumber industry involved in offers of Soviet Russian representatives to sell Russian or Siberian fir in Manila at about half the price of the lowest grade of native lumber, the Philippine Bureau of Forestry has created a committee to study the problem. The Philippine Legislature also is considering the best steps to take to protect the lumbermen from this competition.

Parks of Washington, D. C., contain 200 species of trees, according to the Office of Public Buildings and Parks of the National Capital. Trees of Europe, Asia, Africa, and South America are represented, but the predominating species is American elm.

A 55-year-old stand of loblolly pines that is probably the oldest plantation of the species in America is located at Jesterville, Wicomico County, Md. Planted with wild stock at 8-foot intervals by John F. Jester in 1877, the trees average 90 feet in height and 14 inches in diameter, and the stand shows a yield of 35,320 board feet per acre.

Foreign Notes

The Teak Forests of Java

A highly specialized form of tropical forestry is practiced in the extensive teak forests of Java, which cover about 700,000 hectares (1,730,000 acres) of the island. The teak-timber trade is an important revenue-making activity of the Dutch Government of Java, the surplus of revenue over expenditure averaging £500,000 per year from 1925 to 1929.

E. J. Strugnell, assistant conservator of forests of the British Malayan Forest Service, describes the Javanese teak forests and their management in the Empire Forestry Journal for July, 1932. In Java, says Mr. Strugnell, teak is found from sea level to an altitude of about 2,000 feet, the upper limit varying considerably in different places. It is found growing naturally only in localities with a marked dry season. He continues:

At low altitudes in Java teak is a gregarious tree, a characteristic which adds considerably to its value, owing to the resulting ease of working. In closed stands it grows to an average height of 120 feet with a straight unbranched stem. Under the most favourable circumstances it grows to a height of 150 feet, but on poor soil the average height is in the neighbourhood of 60 feet and the bole is crooked and branchy.

In comparison with the long branchless boles which are frequently met with in the case of species of Shorea and Dipterocarpus in virgin rain forest, teak gives the impression of being a smaller and branchier tree.

The timber is probably the most widely known in the world, and it is doubtful whether another exists with a better combination of good qualities. Its durability is excellent; it is easy to work and does not suffer from splitting, warping, or shrinking if properly seasoned, while it is strong enough for all ordinary purposes. It is somewhat brittle, and cost also limits its use.

Some of the best teak stands are in East Java near Tjepoe, where 33,000 hectares of teak forests are administered by the Dutch Forest Service.

In Tjepoe, teak is growing under favourable circumstances and reaches a large size. Clear felling with artificial regeneration is practised exclusively. The clear-felled area is given out to Javanese contractors

immediately on the close of the rainy season in April and May. The felling slash and other litter is piled on the stumps and burnt. Amongst other advantages this prevents the stumps from coppicing. In contrast to practice in British India, the burning is limited in extent as much as possible.

After burning the ground is worked over by changkol (a large hoe) to a depth of about 15 cm. Hoeing is preferred to ploughing, as the latter is said to disturb the relative position of the soil layers by burying the upper layers. Too-deep working is considered to be harmful, as, of course, is too-shallow working. The cultivation of the soil is done in the dry weather, June to September. Although the ground is hard at this time, the disadvantage is outweighed by the absence of erosion and consolidation of the soil by heavy rains.

The teak seeds are sown at the beginning of the wet monsoon in October. Germination begins in 12 to 15 days and continues until the fortieth day, when it falls off until about the ninetieth day. The teak seeds are sown in rows 2 metres apart in lots of four to five 1 meter apart in the rows. As the germination percentage of teak is in the neighbourhood of 40, it will be seen that this is necessary. The distance between the rows may be increased to 3 metres on the best quality soils, but wider spacing than this leads to the production of misshaped and branchy trees. Blanks are beaten up from more successful clumps of seedlings with plants with not more than four leaves, and weeding of harmful species such as alang-alang (*Imperata* spp.) is carried out.

Between the rows of teak a row of kemlandingan (*Leucaena glauca*) is sown. This has proved its worth in many ways: It improves the quality of the soil by means of the nitrogen-fixing nodules on its roots and by its heavy fall of leaf material; it serves as a cover crop protecting the newly disturbed soil from wash and hardening in the sun; it prevents the growth of the dreaded alang-alang. Many other species have been tried for this purpose, such as walikoekoen (*Schoutenia ovata* Korth.), but none have given such good results. The difference in the growth of teak growing with and without *Leucaena glauca* is marked.

The *Leucaena glauca* must be cut over at the end of the first season, otherwise it is liable to suppress the young teak, and there is also danger of fire. The cut material soon rots and the danger of a fierce fire killing the teak is much diminished.

Between the teak and the cover crop the contractors plant their crops, the most favoured of which is maize, which has given very good results. When the plants have grown well, there is some danger of the crop overshadowing the teak. After harvesting, the haulms are cut and arranged along the teak rows as manure. Care has to be taken that they are not left to interfere with teak or cover crop. * * *

The young teak grows very fast, a height of 2 metres being reached in the first year and 7 in the second, the plant up to this stage consisting of a long unbranched stem.

Thinning is scheduled to take place in the second to fifth years according to the rate of growth. This initial operation, which brings in no revenue, was apparently behindhand in the Tjepoe area (July, 1930). Thinnings are made at intervals during the rotation and a considerable revenue is derived therefrom.

The rotation is fixed provisionally for the majority of stands at 80 years. At present the exploitation is confined, except for a very few planted areas, to old stands up to 350 years old.

It will be realised that, especially where there is sufficient land available for cultivation without entering the forests, it is not always easy to obtain sufficient contractors to deal with the annual felling area. At one time it was endeavoured to attract men by giving rice in part payment, the rice presumably being used until the crop was ready. A system which is now being used is to give the man cattle as repayment for his work, the debt being cleared off when the contract is finished. As the owner can find work for his cattle by extracting timber, the system has advantages for the forest department. Money payments are also largely used.

The contract expires at the end of the second growing season, so that the *Leucaena glauca* can be cut over at the end of the season, the last work expected of the contractor, as the teak can then look after itself. The next areas are given out in the April of the second year to encourage the contractor, while he does the second cutting of the cover crop referred to above, not to cultivate the land for the second season. This second cultivation is often harmful, as the contractor is apt to endeavour to give his crop sufficient light by removing the large leaves of the young teak. The method also has the advantage that fewer contractors are necessary.

The working described above holds for the better quality soils. * * *

When an area comes up for exploitation, the whole of the trees on the area, all teak, are girdled two years before felling. The reason for this girdling is commonly accepted by members of the forest service to be that the timber splits badly if felled green, together with the subsidiary advantages that it is easier to extract, owing to its lighter weight, and that it is partially seasoned. The practice was apparently imported from British India by Hindus accustomed to this method of killing trees on land wanted for cultivation, or from Burma or Siam, where it is practised in order to make the timber light enough for floating, but in none of these countries is teak ringed for the reasons stated by the Dutch, who do no floating. The growing conviction amongst Dutch forest officers that ringing is a useless custom has been considerably strengthened by a recent publication by Dr. Charles Coster, in which he proves conclusively that the girdling of teak two to three years before felling has no influence on the splitting of the timber, or on its physical qualities, and that it is of no use as a method of seasoning. The tree loses 30 per cent of its wet weight during the two years after girdling. It is doubtful whether this decrease in weight results in a similar reduction of transport costs in a method of extraction which does not include floating, while, on the other hand, the increased danger of heartshake and breakage in felling necessitates an expensive method of felling. The rotation is lengthened by two years and the ground becomes covered by secondary growth, owing to the penetration of light to the ground, which adds to the cost of cultivation for the subsequent planting.

Owing to the brittleness of the wood it is often not felled by axe or saw, but is pulled over by a system of cables and pulleys worked by two winches which are operated by five coolies. The tree to be felled is often linked up with another tree by a cable with a certain amount of slack, so that the first tree, as it gathers momentum in falling, pulls the other over with it. Besides the advantage of felling two trees at a time, the fall of both trees is softened. This system of felling has the advantage that the tree can be placed wherever it is wanted by native fellers, which is by no means always the case with axe or saw; even leaning trees can be pulled over through the vertical. As the butt is sawn off while the tree is lying on the ground, there is very much less wastage of timber than with felling with the axe. On the other

hand the method is slow and expensive, although, owing to the low wages ruling in Java (30 to 35 Dutch cents or 7d. per day), the expense is not so great as might be thought, working out at approximately 35 cents (7d.) a tree. After felling, the tree is examined on the ground and instructions given as to the lengths into which it is to be cut up. These are booked. The tree is then cut up and dragged by teams of oxen to the stacking place on a branch of the logging railway, where the booking is checked. The stump is not used and is allowed to fall back, but the amount lost in this way is negligible, as there is no difficulty in cutting the last log off flush with the roots.

High lead logging has been tried in these forests, but can not compete with the primitive team of oxen.

At the stacking place the logs are cut up further if necessary and trimmed. The trimming removes the sapwood all around the log, which after the operation is as near a perfect cylinder as is compatible with the crookedness or otherwise of the log. * * *

With so pronounced a dry season as obtains in the teak areas, the danger of fire is naturally present, and fire towers are erected in commanding places to assist in the control of fires. Formerly large areas were burnt over by leaf fires in the dry season every year, without damaging the teak itself, though the loss of humus is considerable. Fire-control measures have now reduced the area burnt annually very considerably.

Experiments having demonstrated that the Scottish strain of *Pinus sylvestris* is best suited to Danish forest conditions, Denmark is now importing her seed requirements of this species from Scotland instead of from Germany and the Baltic countries, as was formerly the custom. The director of the Danish forestry department personally visited Scotland and selected the areas of Scotch pine from which the seed is to be obtained.

A Rumanian law of 1930 created a special division of the forest department to undertake the restoration of more than 1,000,000 hectares of land in Rumania rendered unproductive by overgrazing, deforestation, and erosion. Owners may be indemnified for loss of income, and the lands are exempted from taxation while restoration work is in progress. If necessary the land may be expropriated. Cost of the work is shared by the State and the local governments.

History of French River Exemplifies Influence of Forests on Streams

A study of the history of the River Ire,[3] in the Department of Savoy, France, reveals the coincidence of periods of exploitation of the forests bordering the river and torrential flooding of the stream. In correlating the known facts about the forest with those concerning the river the effects of deforestation on stream flow are clearly evident.

Until the 18th century there appears to be no record of the river; if peaceful peoples have no history, it can be assumed that it is the same with rivers. But since 1720 frequent floods have been recorded. It was at this same date that the iron industry was developed in Savoy and the forests of the Ire Valley were called upon to supply fuel for the furnaces. For two centuries the deforestation and the floods continued. Particularly disastrous floods occurred in the periods 1858–1878 and 1895–1899, during each of which exploitation of remaining virgin stands left completely denuded areas in the river basin. From the end of the 19th century to the present the forests have been allowed to grow unmolested. They are now in excellent condition, while the river has apparently lost its torrential character, the last flood having occurred in 1914.

Forests in Canada cover 1,151,454 square miles. Some of this land, if cleared, would be suitable for agriculture, but it is estimated that about 1,100,000 square miles can be permanently utilized to the best advantage under forest.

Personals

Samuel N. Spring has been appointed to succeed Hugh P. Baker as dean of the New York State College of Forestry at Syracuse University. Doctor Baker will assume the presidency of Massachusetts State College at Amherst, Mass., on February 1, 1933. Professor Spring has been assistant dean of the New York State College of Forestry since February, 1932. As chairman of a committee which recently reorganized the forestry courses he has made an exhaustive study of the curriculum looking toward better coordination and effectiveness of the training offered by the college. Clyde Leavitt, who in September, 1932, became acting director of forest research of the college of forestry, will succeed Professor Spring with the title acting assistant dean.

James O. Hazard, State forester of Tennessee, has been appointed forestry member of the 1932–33 consulting staff of the Reelfoot Lake Biological Station, Tenn., which is under the management and control of the Tennessee Academy of Science.

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[3] E. Graber: L'Ire et Son Bassin. Revue des Eaux et Forêts, March, 1932, pp. 203–209. English translation in the Indian Forester, September, 1932, pp. 502–506.

Helen E. Stockbridge, librarian of the United States Forest Service, died December 20 following an operation. Miss Stockbridge entered the Forest Service in 1901. Since 1904 she had been in charge of the library, which has increased from a very small nucleus to a complete collection of more than 27,000 books and pamphlets on forestry to which current publications are constantly being added. Miss Stockbridge was an authority on forestry literature, and prepared bibliographies on many different phases of the subject.

Officers elected at the recent annual meeting of the Ohio Valley Section of the Society of American Foresters are Shirley W. Allen, professor of forestry at the School of Forestry and Conservation of the University of Michigan, chairman; T. E. Shaw, extension forester of Indiana, secretary-treasurer; and R. B. Miller, chief forester of Illinois, in charge of new memberships.

George W. Peavy, dean of the school of forestry of Oregon State College, as ranking dean of the college has been made permanent chairman of its administrative council.

E. G. Mason, assistant professor of forestry of the Oregon State College, is at Yale University this year working for the doctor's degree. Richard Kearns is substituting for him at Corvallis.

Harry Smith, a graduate of the Pennsylvania State Forest School, 1925, who has been with the Alabama Department of Forestry for the past six years, is doing graduate work at Yale University.

George M. Jemison, of the Northern Rocky Mountain Forest Experiment Station, Charles A. Connaughton, of the Intermountain Forest Experiment Station, and E. M. Hornibrook, of the Southwestern Forest Experiment Station, junior foresters, are detailed for several months to the Washington (D. C.) office of the Forest Service on projects of their stations. Mr. Jemison is making a study of the relation of duff moisture to weather. Mr. Connaughton's projects are analysis of the rate of melting of snow in open and timbered country as affected by temperature and wind, and determination of rates of growth in the ponderosa-pine type in Idaho from permanent sample plot data. Volume difference between jack and ponderosa pine trees of the same sizes is being studied by Mr. Hornibrook.

Arthur C. Ringland, formerly European forestry representative of the Departments of Agriculture, Commerce, and State, after spending several months in the Washington (D. C.) office of the United States Forest Service, sailed again for Europe in October, 1932, as European forestry specialist of the Forest Service.

Charles H. Schaeffer, for several years associated with the Alabama State Commission of Forestry as forest inspector, as chief of the bureau of silviculture and lands, and as division forester, has accepted a position as district forester with the Florida State Forest Service.

Chapin Jones, State forester of Virginia for 18 years, has been appointed director of education and research of the Virginia division of forestry. F. C. Pederson, assistant State forester under Mr. Jones, has been named acting State forester.

Bibliography

Forest Fire Hazard and Special Fire-Weather Forecasts

By T. E. Reed, United States Weather Bureau

In a recent bulletin published by the Massachusetts Forestry Association,[4] Paul W. Stickel, associate silviculturist at the Northeastern Forest Experiment Station, presents an admirable summary of a study of weather and forest fire hazard in the white pine region of central New England. The report is based on investigations at Petersham, Mass., conducted by the Harvard Forest and the experiment station during the years 1926–1930, inclusive. This study reveals that in the spring months (March, April, and May) 81 per cent of the annual number of fires occur on 93 per cent of the total area burned, accounting for 95 per cent of the damages and 91 per cent of the suppression costs. Only about 3 per cent of the annual fires, area burned, damages, and suppression costs are charged to the fall fire season (October and November).

A concise and interesting relationship is shown between relative humidity and duff-moisture measure-

[4] Stickel, Paul W.: Weather and Forest Fire Hazard with Special Reference to the White Pine Region of Central New England. Massachusetts Forestry Association Bulletin 153. 1932.

ments made in the open at 2 p. m. and forest fires and area burned. Stickel rates as days with a high degree of hazard those on which the relative humidity ranges from 11 to 40 per cent and surface duff moisture content is 7 per cent or less. Such days accounted for 75.6 per cent of the annual fires and 91.3 per cent of the area burned. Days of moderate hazard are those on which the relative humidity ranges from 41 to 50 per cent and surface duff moisture from 8 to 11 per cent. Such days accounted for 13.7 per cent of the fires and 5.9 per cent of the area burned. Days with a relatively low degree of hazard are those on which the relative humidity ranges from 51 to 70 per cent and surface duff moisture from 12 to 22 per cent. Such days accounted for but 7.4 per cent of the fires and 2.1 per cent of the acreage burned. Days with very little or no hazard are those on which the relative humidity ranges from 71 per cent to 100 per cent and surface duff moisture is 23 per cent and higher. Such days accounted for only 3.3 per cent of the fires and 0.7 per cent of the area burned.

In New England more than 99 per cent of the fires are man-caused—mostly by carelessness. Thus it is evident that prevention must be the method of attack to effect control of the problem. The foregoing figures on relative humidity and fire data show that a mid-afternoon reading of relative humidity of 50 per cent or less is indicative of fire danger. Stickel points out that by the use of this information the fire warden, by the cancellation of burning permits, the use of additional patrols in dangerous areas, the temporary enlargement of fire-fighting crews, and other preventive measures, may be able to eliminate fires on such days. This accomplished, the number of fires would be cut down by almost 90 per cent with a resulting reduction in area burned of about 98 per cent.

The amount of moisture in the duff determines the character and severity of forest fires. An interesting graphic presentation of the intake and outgo of duff moisture and the weather factors which influence the precipitation-evaporation cycle is shown in the bulletin. Weather factors directly affecting the degree of hazard—precipitation, heat, atmospheric-moisture deficit, and wind—are discussed.

A rating scale of hazard is presented, based on results of about 600 inflammability tests made with five common firebrands—matches, pipe heels, cigarette butts, small coal sparks such as are thrown off by steam locomotives, and small camp fires. Varying degrees of hazard or zones of inflammability in relation to duff moisture content and these common causes of forest fires are shown.

Observations made in the open and in a mature stand of white pine and hemlock clearly reveal the importance of forest cover in reducing fire danger and confirm the belief that trees themselves are one of the best means of "fireproofing" forest land.

Stickel combines the factors of relative humidity, air temperature, and number of hours since the last measurable amount of precipitation in alinement charts by means of which the fire warden or other forest fire protection official may estimate the moisture content of the duff and predict both the present and future degrees of hazard. Two charts illustrate weather observations made in the open at 11 a. m. and 5 p. m.

Stickel presents clearly the valuable application to all phases of fire control of the information contained in this manual when used in conjunction with the regular and special fire-weather forecasts issued daily by the district fire-weather forecast center of the United States Weather Bureau.

Growth and Yield of the Western White Pine Type

By F. X. Schumacher, United States Forest Service

The results of a thorough study of the growth of even-aged stands of the western white pine type has recently been published by the Department of Agriculture as a technical bulletin.[5] I. T. Haig, of the Northern Rocky Mountain Forest Experiment Station of the Forest Service, conducted the work. His basic data were taken from 306 sample plots of western white pine stands between the ages of 20 and 160 years, each plot having been located in essentially even-aged normal stands judged to be producing maximum volume for their site-age condition. The data from 35 plots were rejected because statistical analysis did not corroborate the judgment of the field men as to their normality.

The bulletin is replete with tables of volume for individual trees of the important timber species encountered, of yields of even-aged stands by 10-year age classes, and of stem distribution by diameter classes within the stands.

A report dealing with all phases of the chemical utilization of wood and embodying the latest developments in this field both in this country and abroad, by H. K. Benson, chairman of the division of chemistry and chemical technology of the National Research Council, has been published by the National Committee on Wood Utilization of the United States Department of Commerce under the title, "Chemical Utilization of Wood." The bulletin has 151 pages and 25 illustrations. It may be obtained from the Superintendent of Documents, Washington, D. C., for 15 cents a copy.

[5] Haig, I. T.: Second-Growth Yield, Stand, and Volume Tables for the Western White Pine Type. U. S. Department of Agricultural Technical Bulletin 323. 1932.

A Technical Study of Redwood

By Selwyn J. Sharp, California Redwood Association

Technical Bulletin 305, "The Strength and Related Properties of Redwood," by R. F. Luxford and L. J. Markwardt, published by the United States Department of Agriculture, reports the results of field work in the redwood region of California and subsequent tests made at the Forest Products Laboratory at Madison, Wis. The field work included a comprehensive density study, covering both virgin and second-growth timber in the important producing regions of Humboldt and Mendocino Counties. The density of trees from various site classes and of wood from various portions of each tree was analyzed.

The strength tests were made from logs of selected trees shipped to the Forest Products Laboratory. Shrinkage determinations were made both in the field and at the laboratory. The trees for the laboratory tests were chosen on a basis of the findings of the density study as representative of the range and the average. The bulletin ably presents the findings of these tests with a comprehensive series of tables and plates and a brief descriptive text. In addition to the tables showing general average figures the appendix includes numerous tables indicating variations which may be attributed to the various factors encountered. Virgin timber receives major treatment in the report.

Intelligent manufacture, grading, and marketing, to take full advantage of natural properties, are essential for the best utilization of any kind of lumber. The required information has come, to a large degree, from the general knowledge of the species gained from experience. The judgment of the men in the mills produces surprisingly good practical results without a background of definite facts. But the broad general knowledge and the opinions of the "old timers" are often less effective in convincing a stranger that he should utilize a certain species. The more specialized the use the more specific must be the data to convince the prospective user that the species is suitable. Such data, as applied to certain of the important properties of redwood, are adequately furnished in this bulletin. During recent years, the use of redwood for purposes in which it is desired to take advantage of its natural durability and in which strength is an important factor has been actively promoted. The facts given in the bulletin are particularly timely, and the values shown for redwood by these tests will, on the whole, assist in this promotion of redwood lumber.

The tests as reported were ably planned and executed to give the desired information. There is usually a feeling in connection with the results of any such series of tests that far different data might have resulted from a more extensive examination. The description of the method used in this particular work gives assurance that the range of conditions has been adequately covered and accurate species averages obtained.

Table 3, giving relative values for redwood as compared with other species, will probably prove of greatest usefulness in general promotional work. This direct comparison between species seems to be the most widely requested and the most effective class of information. Most buyers are intimately acquainted with some particular species, and a comparison with the well-known wood is in many cases all that is desired. Table 4, giving general averages for density, shrinkage, and strength, will likewise be extensively used for information in regard to the qualities of redwood.

For many important specialized uses, variations from the average are more important than the average. For this reason the more detailed tables given in the appendix, while they will not be used as extensively as the general averages, will prove of greater value in many instances. These tables do not, of course, cover all of the variable factors encountered, but the value of further segregation would probably not justify it. Three graphic plates showing values for individual tests are particularly interesting.

A considerable segregation of redwood into density classes is now made by manufacturers. For such uses as pattern lumber and the best grades of finish and siding, the lightweight stock is particularly valuable. Uniformity, appearance, light weight, and ease of working are more important considerations than strength for these purposes. Where strength is a major consideration, structural grades, selected from heavy stock, are usually specified. The selection of this stock must continue to be based upon the judgment of mill men and inspectors. The exact data given in this bulletin will confirm or disprove theories on which this judgment is based. The use of these facts should, therefore, improve the accuracy of the judgment and assist in better selection of material for specific uses.

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"Australian Timber Identification" is the title of a bulletin recently issued by the Council of Scientific and Industrial Research, Division of Forest Products, Melbourne, Australia, as Trade Circular No. 8.

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